

Claims

What is claimed is:

- 5 1. A spray device for cleaning at least one optical surface having limited access thereto, said spray device comprising:
 - a fluid reservoir;
 - a nozzle assembly communicating with said fluid reservoir to deliver liquid
 - 10 spray to at least one optical surface; and
 - an absorbent to collect liquid residues from said liquid spray.
2. The spray device of claim 1, wherein said fluid reservoir includes a pump to deliver fluid to said nozzle assembly.
3. The spray device of claim 1, further including a cover tube having a first end and a second end, said nozzle assembly coupled to said first end of said cover tube and said fluid reservoir located adjacent to said second end of said cover tube.
4. The spray device of claim 3, said cover tube having an inner wall and an outer wall, said spray device further including a delivery tube, located inside said inner wall coaxial with said cover tube, said delivery tube coupled to said fluid reservoir to deliver fluid to said nozzle assembly.
5. The spray device of claim 1, wherein said nozzle assembly includes a shroud overlapping said first end of said cover tube, said shroud providing containment for a nozzle having a nozzle end including a shaped orifice, said delivery tube being connected to said nozzle to deliver fluid to said nozzle end to provide said liquid spray emitting from said nozzle end in a pattern according to said shaped orifice.
6. The spray device of claim 5, wherein said shroud includes a contact end having a seal to provide substantially fluid-tight contact between said spray device and the optical surface.

7. The spray device of claim 5, wherein said shaped orifice comprises an orifice selected from the group consisting of circular orifices, elliptical orifices, rectangular orifices, oblong orifices and combinations thereof.

8. The spray device of claim 5, wherein said nozzle assembly further includes a return channel to guide said liquid residues toward said absorbent mounted adjacent to said outer wall of at least a portion of said cover tube after application of fluid to at least one optical surface.

9. The spray device of claim 8, wherein said liquid residues collect in said absorbent after passing through drain holes formed in said at least a portion of said cover tube.

10. A portable, self-contained spray device for cleaning at least one optical surface, said spray device comprising:

a fluid reservoir;

a cover tube having an inner wall, an outer wall, a first end and a second end;

a nozzle assembly at said first end of said cover tube, said nozzle assembly including a seal to provide substantially fluid-tight contact between said spray device and the optical surface;

a delivery tube, located inside said inner wall coaxial with said cover tube, said delivery tube coupled to said fluid reservoir to direct fluid towards said nozzle assembly; and

an absorbent mounted adjacent to said outer wall of at least a portion of said cover tube to collect liquid residues after application of fluid to an optical surface.

11. The portable, self-contained spray device of claim 10, wherein said at least a portion of said cover tube has a plurality of drain holes formed therein to release said liquid residues for collection by said absorbent.

12. The portable, self contained spray device of claim 10, wherein said nozzle assembly includes a shroud overlapping said first end of said cover tube, said shroud providing containment for a nozzle having a nozzle end including a shaped orifice, said delivery tube being connected to said nozzle to deliver fluid, from said fluid reservoir, to provide said liquid spray emitting from said nozzle end in a pattern according to said shaped orifice.

13. The portable, self-contained spray device of claim 12, wherein said shaped orifice comprises an orifice selected from the group consisting of circular orifices, elliptical orifices, rectangular orifices, oblong orifices and combinations thereof.

14. The portable, self-contained spray device of claim 11, wherein said nozzle assembly further includes a return channel to direct said liquid residues for collection by said absorbent.

15. A spray device for cleaning at least one optical surface having limited access thereto, said spray device comprising:

a fluid reservoir;

a cover tube having an inner wall, an outer wall, a first end and a second end;

a nozzle assembly at said first end of said cover tube, said nozzle assembly including a seal to provide substantially fluid-tight contact between said spray device and the optical surface;

a delivery tube, located inside said inner wall coaxial with said cover tube, said delivery tube coupled to said fluid reservoir to direct fluid towards said nozzle assembly; and

an absorbent cartridge mounted adjacent to said outer wall of at least a portion of said cover tube to collect liquid residues after application of fluid to an optical surface, said absorbent cartridge comprising a detachable jacket surrounding an absorbent.

16. The spray device of claim 15, wherein said detachable jacket has openings formed therein to facilitate evaporation of liquid from said absorbent.

17. A process for cleaning at least one optical surface having limited access thereto
said process comprising the steps of:

providing at least one optical surface having limited access thereto;

wiping a dry cleaner against the at least one optical surface; and

applying a liquid cleaner to the at least one optical surface using a liquid
spray device comprising:

a fluid reservoir;

a nozzle assembly communicating with said fluid reservoir, said nozzle
assembly adapted to reach the at least one optical surface to deliver liquid spray thereto;
and

an absorbent to collect liquid residues from said liquid spray.

18. The process of claim 17, wherein said spray device further includes a cover tube
having a first end and a second end, said nozzle assembly coupled to said first end of said
cover tube and said fluid reservoir located adjacent to said second end of said cover tube.

19. The process of claim 18, wherein said cover tube has an inner wall and an outer
wall, said spray device further including a delivery tube, located inside said inner wall
coaxial with said cover tube, said delivery tube coupled to said fluid reservoir to deliver
fluid to said nozzle assembly.

20. The process of claim 17, wherein said nozzle assembly includes a shroud
overlapping said first end of said cover tube, said shroud providing containment for a
nozzle having a nozzle end including a shaped orifice, said delivery tube being connected
to said nozzle to deliver fluid to said nozzle end to provide said liquid spray emitting from
said nozzle end in a pattern according to said shaped orifice.